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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 15

Application Number: 09/898,082
Filing Date: July 05, 2001
Appellant(s): SUGA, TADATOMO

Joseph A.Rhoa
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/21/2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1,3-9, 20-24 stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,939,789	KAWAI et al	8-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-9, 20-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawai et al.

Regarding claim 1, Kawai et al discloses on figure 12c a semiconductor device comprising:

Claims	Kawai
a first portion comprising a first substrate, a conductive layer and an insulating layer laminated on the first substrate and a bonding surface that is chemically mechanically polished and exposes a conductive region and insulating region;	a first portion comprising a first substrate 1,a conductive layer 4 and insulating layer 1 laminated on the first substrate and a bonding surface that is polished and exposes a conductive region 4 and insulating region 1;
wherein the conductive region includes a concave surface defining a dishing portion; a second portion comprising a second substrate, a conductive layer and an insulating layer laminated on the second substrate and a bonding surface that is chemically mechanically polished and exposes at least a conductive region having a concave surface defining a dishing portion; and	wherein the conductive region includes a surface 2; a second portion1 comprising a second substrate 1, a conductive layer 4 and an insulating layer 1 laminated on the second substrate and a bonding surface 2 that is polished and exposes at least a conductive region having a concave surface 2 defining a dishing portion; and
wherein the bonding surface of the first	wherein the bonding surface of the first

portion and the bonding surface of the second portion are solid state bonded to each other so that the dishing portions of the conductive regions of the respective first and second portions are bonded to each other so as to contact one another; and at least one of the boding surface of the first portion and the bonding surface of the second portion has the insulating region lowered with respect to the conductive region.

portion and the bonding surface of the second portion are solid state bonded to each other so that the portions of the conductive regions of the respective first and second portions are bonded to each other so as to contact one another; and at least one of the boding surface of the first portion and the bonding surface of the second portion has the insulating region 1 lowered with respect to the conductive region 4.

Regarding claim 3, wherein the conductive region of the first portion and the conductive region of the second portion are solid state bonded to each other, and the insulating region of the first portion and the insulating region of the second portion face each other with interposition of a clearance.

Kawai et al discloses on figure 12c the conductive region 4 of the first portion and the conductive region 4 of the second portion are solid state bonded to each other, and the insulating region 1 of the first portion and the insulating region 1 of the second portion face each other with interposition of a clearance 8.

Regarding claim 4, wherein the insulating region that surrounds the conductive region of the first portion and the insulating region that surrounds the conductive region of the second portion face each other with interposition of a clearance.

Kawai et al discloses on figure 12c the insulating region 1 that surrounds conductive region 4 of the first portion and the insulating region 1 that surrounds the conductive region 4 of the second portion face each other with interposition of a clearance.

Regarding claim 5, wherein the conductive region of the first portion and the conductive region of the second portion are solid state bonded to each other, and the insulating region 1 of the first portion and the insulating region of the second portion are put in contact with or solid state bonded to each other.

Kawai et al discloses on figure 12c the conductive region 4 of the first portion and the conductive region 4 of the second portion are solid state bonded to each other, and the insulating region 1 of the first portion and the insulating region 1 of the second portion are put in contact with or solid state bonded to each other.

Regarding claim 6,wherein the

Kawai et al discloses on figure 12c

insulating region 1 that surrounds the conductive region of the first portion and the insulating region that surrounds the conductive region of the second portion are put in in contact with or solid state bonded to each other.

the insulating region 1 that surrounds the conductive region 4 of the first portion and the insulating region 1 that surrounds the conductive region 4 of the second portion are put in in contact with or solid state bonded to each other.

Regarding claim 7, wherein the conductive regions are end surface of through hole conductors and the insulating regions are end surfaces of through hole insulators that surround that respective through hole conductors.

Kawai et al discloses on figure 12c the conductive regions 4 are end surfaces of through hole conductors and the insulating regions 1 are end surfaces of through hole insulators that surround that respective through hole conductors.

Regarding claim 8,wherein the conductive regions are end surfaces through hole conductors and the insulating regions are end surfaces of through hole insulators that

Kawai et al discloses on figure 12c the conductive regions 4 are end surfaces of through hole conductors and the insulating regions are end surfaces of through hole insulators that

surround the respective through hole conductors.

surround the respective through hole conductors.

Regarding claim 9,wherein the first substrate or the second substrate is any one of a semiconductor substrate, an inorganic substrate and an organic substrate.

Kawai et al discloses that the first substrate or the second substrate is any one of a semiconductor substrate, an inorganic substrate and an organic substrate.

Regarding claim 20, a semiconductor device comprising a first substrate supporting a first insulating layer with a contact hole defined therein , and a first conductive material filling in the contact hole in the contact hole in the first insulating layer and protruding above a surface of the first insulating layer; a second substrate supporting a second insulating layer with a contact hole defined therein, and second conductive material

Kawai et al discloses on figure 12c a semiconductor device comprising a first substrate supporting a first insulating layer 1 with a contact hole defined therein, and a first conductive material 4, 5 filling in the contact hole in the first insulating layer and protruding above a surface of the first insulating layer 1; a second substrate supporting a second insulating layer 1 with a contact hole defined therein, and second conductive material 4

filling in the contact hole in the second insulating layer; and wherein the first conductive material that fills in the contact hole in the first insulating layer and the second conductive material that fills in the contact hole in the second insulating layer are solid state bonded to each other so as to contact one another in a bonded state.

filling in the contact hole in the second insulating layer 1; and wherein the first conductive material that fills in the contact hole in the first insulating layer and the second conductive material that fills in the contact hole in the second insulating layer are solid state bonded to each other so as to contact one another in a bonded state.

Regarding claim 21, wherein the second conductive material filling in the contact hole in the second insulating layer protrudes above a surface of the second insulating layer.

Kawai et al disclose on figure 12c the second conductive material 4 filling in the contact hole in the second insulating layer protrudes above a surface of the second insulating layer.

Regarding claim 22,wherein the first and second conductive materials are of the same material.

Kawai et al disclose on figure 12c the first and second conductive materials are of the same material.

Regarding claim 23,wherein concave surfaces of the respective first and second conductive materials are bonded to one another so as to contact each other.	Kawai et al disclose on figure 12c concave surfaces of the respective first and second conductive materials are bonded to one another so as to contact each other.
Regarding claim 24,wherein a gap or clearance 8 is defined between the first and second insulating layers adjacent an area where the conductive materials are solid state bonded to one another.	Kawai et al disclose on figure 12c a gap or clearance 8 is defined between the first and second insulating layers adjacent an area where the conductive materials are solid state bonded to one another.

(11) Response to Argument

On page 6, with respect to claim 20, Appellant argues "In Kawai the Cu material which fills opposed through hole 4 is not directly bonded to each other and thus is in non-contacting relation. In other words, in direct contrast with the requirement of claim 20, in Kawai the conductive materials in different holes 4 are not in contact with one another". However, such argument should not be deemed to be persuasive. The conductive materials 4 in Kawai is clearly in contact with one another through bonding

members 5. Note that claim 20 does not require a direct contact between the conductive materials. Hence, conductive materials 4 are at least in electrical contact with one another.

Further, with respect to claim 21, Appellant argues, "In figure 12 c of Kawai Cu 4 does not protrude above a surface of a corresponding insulating layer 1. Instead, the top surface of Cu material in a hole 4 is flush with the top surface of insulating layer 1. Moreover, it cannot be said that Sn bonding members 5 meet this aspect of claim 20, because Sn bonding members 5 are not the same materials filling a contact hole as required by claim 21 (Sn and Cu are clearly different materials)". However, Kawai teaches that the bonding members 5 are made of metal or an alloy (col. 7, lines 13-14). This implies that the bonding members 5 can be made of Cu since Cu is a metal. As such, the filling material and the bonding members are the same materials. Therefore, the conductive materials 4 filling in the contact hole in the second insulating layer protrudes above a surface of the second insulating layer. It should be noted that the protruding portion herein is the bonding member 5.

With respect to claim 23, Appellant argues that Kawai does not disclose, "concave surfaces of the respective first and second conductive materials are bonded to one another so as to contact each other". However, the so-called concave surfaces of the respective first and second conductive materials only emerge in the intermediate step of the bonding process. After the two conductive materials are bonded together, these concave surfaces no longer exist in the finished product as shown in figure 4 of the instant application. In other words, the so-called concave surfaces do not structurally distinguish the claimed invention from Kawai.

With respect to claim 1, Appellant argues that Kawai fails to disclose or suggest the concave surface dishing portions of claim 1 and that in Kawai the Cu material which fills through holes 4 does not have a dishing portion and the Sn bonding members 5 and metal wirings 2 also have no concave dishing portions on respective surfaces thereof. However, the so-called concave shaped surface defining a dishing portion only exists in the intermediate step of the bonding process as shown in figure 3 of the instant application. When the two portions are solid stated bonded to each other, the concave shaped surface defining a dishing portion is no longer in the final product as disclosed in figure 4 of the instant application. Since the claim appears to be defining a final product, the concave shaped surface defining a dishing portion does not structurally distinguish over Kawai.

With respect to claim 5, Appellant argues that Kawai fails to disclose or suggest "the insulating region of the first portion and the insulating region of the second portion are put in contact with or solid state bonded to each other". However, Kawai clearly discloses on figure 12c the insulating region 1 of the first portion and the insulating region 1 of the second portion are put in contact with or solid state bonded to each other through bonding members 9, 10 thereof.

Lastly, with respect to claim 6, Appellant argues that Kawai fails to disclose or suggest "the insulating region that surrounds the conductive region of the first portion and the insulating region that surrounds the conductive region of the second portion are put in contact with or solid state bonded to each other". However, Kawai clearly discloses on figure 12c the insulating region 1 that surrounds the conductive region 4 of the first portion and the insulating region 1 that surrounds the conductive region 4 of the

second portion are put in contact with or solid state bonded to each other through bonding members 9, 10 thereof.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Examiner
Art Unit 2815

c.c
June 26, 2003

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